**Yvonne Rogers**

# Instilling Interdisciplinarity

## HCI from the Perspective of Cognitive Science

**Education**

HCI is taught as a core subject on our Masters programme in Human Centered Computer Systems (HCCS) at Sussex University. A main objective of the Masters programme is to enable students to learn how to apply techniques from psychology, software engineering and cognitive science to the design, implementation and evaluation of interactive computing systems. It is aimed at graduates in psychology, computer science, and related disciplines, to develop technical and analytical skills, an understanding of human computer interaction, and human-centered approaches to software design and deployment. It focuses on the application of cognitive psychology to technology design, and in seeking a balance between the interdisciplinarity of cognitive science and the detailed technical skills needed for software engineering. To facilitate this form of interdisciplinarity, graduates in psychology take introductory programming courses, whilst graduates in computer science take introductory courses in psychology. Both sets of students also take modules in software design, evaluation methods, object oriented programming for AI, integrated studies and various options (e.g. Interactive Learning Environments, CSCW) – whose content and structure draw from various disciplines.

An overarching aim of the Masters programme is to enable multidisciplinary students to become more interdisciplinary. By this, it is meant providing a mixed cohort of students (who have a background in either computer science or psychology or other related discipline) with the opportunity to learn and work closely together. By the end of their studies it is hoped that they will have developed an understanding of HCI that integrates different concepts, methods and epistemologies from different disciplines. So instead of saying, "I am a psychologist or a computer scientist working in HCI" they should say something like "I am a HCI specialist doing human-centred design."

The nature of the programme is highly intensive, requiring them to complete 4 modules per quarter, for the autumn and winter terms. Many of the modules require them to work in teams, developing software prototypes, giving presentations, using computer conferencing to discuss theoretical papers and so on. Such intense working forces the students to face many challenges, including group dynamics, which is often a big learning experience.

### HCI Module

The HCI module is seen as a foundation course, that has close links with the other moules. For example, approaches to design and evaluation that are covered in this module, feed directly into modules on Psychological Methods for System Evaluation and Software Design, respectively. Topics covered in the HCI module include user-centred design, interface and interaction design, interactional devices and technologies, cognitive and social aspects of HCI and evaluation techniques. Students are introduced to key concepts and methods in HCI design, such as prototyping, task analysis, heuristic evaluation and usability testing. There is much emphasis on learning through doing. Mini-projects include using design principles and evaluation heuristics to evaluate various devices, e.g. mobile phones, interactive toys, VCRs. Students are initially asked, based on their common-sense understanding to explain whether and how these devices are usable. They are then asked to repeat the exercise a couple of weeks later – but this time with some hindsight of HCI knowledge – and to reflect on the difference. Other exercises require them to work collaboratively in a participatory design setting, using low-tech methods of prototyping to develop artifacts that meet different sets of constraints.

Does the module achieve its objectives? Student feedback is always a useful indicator of this. A typical quote from one of the students is (see www.cogs.susx.ac.uk/grad/hccs/students.html).

"This module looks at the usability of the computer-based objects we meet in everyday life. Week one saw us spending the coffee break analyzing the drinks machine (it didn't fare very well). For week three we all brought in something to evaluate, such as a mobile phone, organizer or electronic pet (!). Week six saw us building paper toasters (ours played the telletubbies theme) as an exercise in low-tech prototyping - a surprisingly informative exercise. If you need an excuse to 'play' with the internet, this is it. Week seven's exercise was to present an evaluation of two web sites. As a whole, the module is more the discussion of theories than empirical evidence. Overall - enjoyable, informative and useful."

The process of becoming interdisciplinary An important part of the programme is to enable students to see how HCI fits in with other aspects of developing human-centred systems. To help them accomplish this, we provide a module that runs each quarter which is called Integrated Studies I and II, respectively. The aim of these interlinked courses is to provide stu-

dents with the opportunity to bring together ideas, methods and approaches from the other modules and explore common themes. Integrated Studies I asks them to examine the nature of interactivity across their different courses. An overall view of the course is given below by one of this year's students:

"This course is a forum for bringing together ideas from the other courses and exploring the nature of Interactivity. Learning is based around reading a set of articles and commenting on them. Discussion takes place both in seminars and via a computer-mediated conference. You are also expected to give a presentation related to one of the papers and run some follow-up discussion based on comments made on the conference. Using a conference was a novel experience for me and in itself very interesting. Assessments involve a written report and evaluation of the conference, a presentation on the process of designing and evaluating a website and the production of a website. The assessment of the website is actually based on a reflective document describing the design process and evaluation of the website. The production of these assignments is itself a useful learning experience; you can expect to have to teach yourself HTML, and any other skills relevant to the production of your site. I enjoyed this course a lot and found that it really did offer me the opportunity to bring together ideas from the other winter term courses, particularly in the execution of the assignments."

The second Integrated Studies module is based around the theme of Interdisciplinarity and team working, reflecting on the issues they will have to face when working as teams in their others modules for that quarter. As commented by a student from last year, it was extremely useful:

"Integrated Studies II provides a mix of topics, designed to support the other modules. One particularly useful part was learning about business meetings. While not immediately clear how this

relates to HCCS, this is a really useful area to understand. The group dynamics involved with business meetings can ruin the best laid plans of system designers. It is one thing to be certain that a particular approach to HCI design is a disaster waiting to happen. It is another thing to persuade the board of directors that their idea is the cause of the problem. The module covers other 'blanket' issues, such as communication and project management. Essential studies for anyone wanting to work in the computer systems design industry."

**Success of the HCCS Masters Programme**

In many ways, we believe we have succeeded in developing an integrated programme, which enables students to understand the multifaceted side of developing human-centered systems and to see where HCI is placed within the broader context of cognitive science. Importantly, we believe that they should be given the opportunity to develop a diverse range of research and applied skills, from low level programming in Java to high level discussions on the value of theoretical concepts in Activity Theory for HCI.

Students graduating from the course usually have no difficulty finding employment in user-centered design (many join large corporations or small enterprises). A small number also continue with postgraduate studies in the field.

**So are there Any Problems?**

The main problem students experience on this highly intensive programme is not having enough time to study topics in depth. At a national level, students are also increasingly becoming assignment-driven. This means that they tend to omit to do the optional work that is set but which is explicitly provided to allow them to reflect on the interdisciplinary aspects of HCI. Often, it is only at the end of a module that they appreciate what it was all

about and the value of what seemed to them initially like very vague projects to work on. Another problem that can arise is that some students will persist in identifying with their first degree and continue to consider themselves as a computer scientist or a psychologist. In such cases, it can be difficult for the student to move from a single disciplinary perspective to a multidisciplinary one, let alone an interdisciplinary mindset. On the other hand, increasingly, we are receiving applications from students who already have degrees in cognitive science or other interdisciplinary subjects. The positive experience of pursuing an interdisciplinary subject for their undergraduate degree was such that they deliberately select a graduate course that offers them the opportunity again to learn from an interdisciplinary perspective.

**About the Author**

Yvonne Rogers is a professor in the School of Cognitive and Computing Sciences at Sussex University in the UK, where she teaches HCI and Cognitive Science. Prior to this she was at the Open University, UK, where she was involved in developing a distance learning Masters program in HCI. Before that she worked as a senior researcher in the Human Factors group at a telecommunications company (Alcatel). She has also been a visiting professor at Stanford University and Apple Research Labs. She has published widely in the area of HCI and was one of the main authors (with Jenny Preece and others) of the highly successful textbook on Human Computer Intertaction (published by Addison-Wesley).

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